MECHANICAL SPECIFICATIONS

SECTION 15250 - INSULATION

PART 1 - GENERAL

1.1 CODE COMPLIANCE

A. Insulation materials, thickness and installation shall comply with the state and/or local energy code requirements. This Specification applies where a Code is not applicable.

1.2 QUALITY ASSURANCE

A. Qualification of Workmen: Use proficient journeyman insulators and supervisors in the execution of this portion of the work to ensure proper and adequate installation of insulation throughout.

1.3 SUBMITTALS

A. Product Data: Before insulating materials are delivered to the job site, submit complete data showing insulation materials proposed to be furnished and installed.

1.4 FIRE HAZARD CLASSIFICATION

A. Maximum fire hazard classification of the composite insulation construction as installed shall be not more than a flame spread of 25, fuel contributed of 50 and smoke developed of 50.

B. Pipe insul. shall be tested in accordance with the requirements of UL label. "Pipe and Equipment Coverings R5583 400 8.15."

C. Duct insul. shall be tested in accrd. with ASTM E-84 and bear the UL label.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Owens-Corning, Manville Company, PPG, Knauf, Armstrong or accepted substitute.

2.2 MATERIAL

A. Fiberglass Sectional Pipe Insulation: Thermal conductivity of 0.23(BTU*in)/ hr*sq.ft.*deg. F) at 75F mean temperature. Minimum density of 1.5 pounds per cubic foot. Jacketed with white vapor barrier laminated of aluminum foil and white Kraft paper reinforced with glass fiber strands. Jacket shall have factory applied self-sealing lap.

B. Flexible elastrometric pipe insulation thermal conductivity 0.27 BTU-in./h-ft²-ºF at 75ºF Mean temperature. Flame spread rating of 25 or less and a smoke-developed rating of 50 or less when tested in accordance with ASTM E-84.

C. Duct Wrap: Fiberglass duct insulation with thermal conductivity of 0.23 (BTU*in)/hr*sq.ft.*deg. F) at 75F mean temperature. Minimum density of 1.5 pounds per cubic foot. Factory applied flame retardant foil reinforced Kraft vapor barrier facing.

D. Duct Lining:

1. Acoustical duct liner with thermal conductivity of 0.26 (BTU*in)/ hr*sq.ft.*deg. F) at 75F mean temperature. Minimum density of 1.5 pounds per cubic foot.

2. Based on a No. 6 mounting in accordance with Test Method ASTM-C-423, liner shall have sound absorption coefficients as follows:

Thickness Sound Absorption Coefficients at Frequencies of:

Inches	125	250	500	1000	2000	4000	NBC
1	.18	.54	.58	.80	.86	.83	.70

PART 3 - EXECUTION

3.1 INSULATION THICKNESS

Domestic Cold and Hot Water Pipe Insulation applies to ALL piping regardless of material.

A. Domestic Cold Water Supply Pipe - 1/2 Inch and Larger: Cover with l/2-inch fiberglass sectional pipe insulation or 1/2 inch flexible elastomeric pipe insulation.

B. Domestic Hot Water Pipe: Cover with 1-inch fiberglass sectional pipe insulation (thickness shall be 1.5" for pipes larger than 2"), or 1/2 inch flexible elastomeric pipe insulation. On HW return piping 1" insulation having a thermal conductivity not exceeding 0.28 (BTU*in)/ hr*sq.ft.*deg. F) at 75F.

C. Ductwork: Wrap all supply and return ducts with 3-inch duct wrap in attic space. Wrap all supply ducts w/R-8 within building envelope. Seal insulation with Nashua 322.

D. Duct Lining: Line ducts where shown with 1 inch duct liner. Ducts exposed to weather shall have 2 inch duct liner.

3.2 INSTALLATION

A. Installation shall be continuous through walls, floors, partitions except where noted otherwise.

B. Fiberglass Sectional Pipe Insulation: Apply insulation to pipe and seal with self-sealing lap. Use self-sealing butt strips to seal butt joints. Insulate all fittings, valves and unions with single or multiple layers of insulation and use preformed PVC molded insulation covers.

C. Duct Liners: Apply with fire resistant adhesive to flat sheet with 100 percent coverage. For widths over 20-inches, additionally secure the liner with mechanical fasteners at 15-inch centers. Coat exposed and leading edges of transverse joints with suitable fire resistant adhesive.

D. Pipe insulation is not required on domestic water piping in interior insulated walls.

E. All pipes subject to freezing shall be insulated and protected as shown in details on drawing A8.5.

SECTION 15400 - PLUMBING

PART 1 - GENERAL

1.1 WORK INCLUDED

A. Work includes but is not limited to the following:

1. All waste, vent, condensate and storm drain piping.
2. All fixtures, drains, valves and trim.
3. Hot water, cold water and gas piping.
4. Connection to all equipment requiring cold water, hot water, gas and drains.

1.2 SUBMITTALS

A. Provide Shop Drawings for the following equipment:

Plumbing Fixtures.	Drains.
Plumbing Specialties.	Water Heating Equipment.
Plumbing Cleanouts.	Gas Piping.

1.3 PLUMBING ABOVE FOOD HANDLING ESTABLISHMENTS

A. All openings through floors over such areas shall be sealed watertight to the floor construction.

B. Floor and shower drains installed above such areas shall be equipped with integral seepage pans.

C. All other soil or drain pipes shall be of an approved material as listed Table 14-1 and Section 701.0. All materials shall conform to established standards. Clean outs shall be extended through the floor constructions above.
Extra heavy duty couplings are required.

D. Soil and drain pipes located above such area shell be subjected to a standing water test of not less than 25 feet.

E. Piping subject to operation at temperatures that will form condensation on the exterior of the pipe shall be thermally insulated.

F. Where pipes are installed in ceiling shall be of the removable type, or shall be provided with access panels in order to form a ready access for inspection of piping.

END OF SECTION

PART 2 - PRODUCTS

2.1 PIPING

A. Soil, Waste, Vent And Storm Water Piping:
1. Underground and Above Ground Piping: No-Hub cast iron soil pipe and fittings with stainless steel couplings and neoprene gaskets. ABS-DWV approved at Contractor's option, subject to approval of local Plumbing Codes, rules and regulations. (Use approved firestop devices).

B. Water Piping and Condensate Piping:
1. Above Grade: Type M Copper. Joints shall be made with 95/5 solder. Schedule 40 PVC, CPVC or PEX, as allowed by local authority having jurisdiction.
2. Below Grade: Type L copper. Joints shall be brazed, CPVC, Ductile Iron or as allowed by code. PEX tubing as allowed by local authority having jurisdiction.

C. Gas Piping: Schedule 40 black steel pipe and malleable screwed fittings or CSST. Underground: PVC coated Schedule 40 black steel.

2.2 PLUMBING FIXTURES

A. General: Provide new plumbing fixtures shown on the Drawings and of the quantity shown with all fixtures of one manufacturer.
1. Fixtures: American Standard, Eljer or Sterling. China type. Complete with fittings, supports, fastening devices, faucets, valves, traps, stops and appurtenances required. Enameled steel not approved.
2. Exposed Piping and Tubing: Brass, chrome plated.
3. Escutcheons: Brass, chrome plated.
4. Warranty: All fixtures warranted not to craze, color or scale.
5. Fixtures set and connected to soil, waste, vent and water supplies in neat, finished and uniform manner.
6. Connections: Equal height, plumb and set at right angles to floor, wall or both.
7. Stops: Installed in each supply pipe at each fixture accessibly located with with wall escutcheons.
8. Water coolers shall be refrigerated type. (Approved per ADA).

B. Plumbing Trim:
1. Traps: Provide traps on all fixtures except fixtures with integral traps. Type ABS on all above floor fixtures except kitchens fixtures.
2. Supplies and Stops: Brasscraft, Central Brass, McGuire.
3. Closet Seats: Solid white reinforced plastic. Olsonite, Church, Bemis or Beneke.
4. Fittings: Sloan, Delta, Moen, American-Standard, Kohler or approved. Verify selection with Architect.
5. Handicapped Fittings: Provide single lever chrome plated brass handle type faucet. Moen, Delta or approved.
6. Shower Valves: Single lever type, pressure compensating valves. Delta

2.3 FLOOR DRAINS

A. Floor Drains: Coated cast iron body, double drainage flange with weep holes, primer connection, flashing clamp device, adjustable strainer. Jay R. Smith 2010-A.

2.4 ACCESS COVERS

A. Furnish and install access covers where required in ceilings and walls to service shock absorbers and shutoff valves.

2.5 PLUMBING SPECIALTIES

A. Trap Primers: Trap seal primer valve with automatic vacuum breaker. Jay R. Smith 2699. Wade, Zurn, PPP approved.

B. Shock Arrestors: Precharged bellows or piston type with integral flow orifice; meeting PDI Standard WH-201. Provide access panels for concealed installation. Jay R. Smith Series "5000." PPP and Wade approved.

2.6 PLUMBING CLEANOUTS

A. Cleanouts Shall be located as required by the Administrative Authority. Cleanouts shall be the same size as the pipe except that greater than 4 inch will not be required. Inside floor type shall have polished nickel bronze tops, and wall type shall have stainless steel covers. All cleanouts shall be Zurn, Jay R. Smith. Outside cleanouts to grade shall be adjustable and vandalproof.
1. Carpet, Vinyl or Tile Floor Cleanouts: Jay R. Smith 4023.
2. Wall Cleanout: Smith 4472 bronze plug and stainless steel cover.

2.7 WATER HEATERS

A. Water Heaters shall be gas meeting current Energy Code and labeling requirements in accordance with local and/or State Regulations. Each water heater to be equipped with Temperature/Pressure Relief Valve constructed to ASME and ANSI Z21.22. Lead free materials: Watts LF-Series to exceed the BTU input of water heater.

B. Manufacturer: Rheem, Ruud, A.O. Smith, State, Grundfos or approved.

C. Circulating Pump: Domestic hot water recirculating pump, all bronze construction, in-line centrifugal, 1750 rpm, flexible coupling, sleeve bearing w/timer and thermostatic control. Bell and Gossett, Paco, Armstrong or approved. Verify electrical requirements.

2.8 VALVES

A. General: Provide Valves on branch pipe connection to mains, and at connections to equipment where indicated. All valves accessible and fully equal in size to piping.

2.9 ROOF DRAINS - STANDARD & OVERFLOW

A. Cast iron body, flashing ring, drain receiver, cast iron dome and underdeck clamp.

2.10 HOSE BIBBS

A. 3/4 inch non-freeze. Woodford 20 or equal.

PART 3 - EXECUTION

3.1 EXECUTION AND BACKFILL

A. General: Perform all necessary excavation and backfill required for the installation of mechanical work. Any piping or other work damaged during excavation and backfilling shall be repaired at Contractor's expense.

B. Water: Keep all excavations free of standing water. Excavations damaged or softened by water or frost shall be re-excavated and filled back to original level with sand, pea gravel or other approved material by the Contractor at own expense.

C. Tests: During the progress of the work for compacted fill, the Architect or Owner reserves the right to request compaction tests made under the direction of a recognized testing laboratory.

D. Bedding: All piping shall be full bedded on sand or 3/4-inch minus crushed rock. A minimum 4-inch deep layer shall be placed on the leveled trench bottom for this purpose. The fill shall be removed to the necessary depth for piping bells and couplings to maintain contact of the pipe on the bed material for its entire length.

E. Backfill: Backfill material shall be approved by Architect. All backfill shall be placed in layers not exceeding 8 inches deep and compacted to 95 percent of maximum density at optimum moisture content to preclude subsequent settlement.

F. Grading: Following backfilling, grade trenches to the level of surrounding soil. All excess soil shall be disposed of at the site stockpile or as directed by the Architect.

G. Water Heating: Provide circulating system as shown on the mechanical plans and the current adopted energy code.

3.2 KITCHEN FIXTURES

A. Plumbing Contractor to rough-in and make connections to kitchen equipment. Furnish all traps and stops required. Install all valves, fittings, and controls furnished with food service equipment as loose items, provide interconnecting piping required to complete connections to waste, vent and water systems. Verify extent of connection requirements and fittings with kitchen supplier. All exposed piping to be chrome plated. Refer to Kitchen Equipment Schedule on Architectural Drawings.

3.3 CUTTING, PATCHING, REPAIRING

A. Cutting, patching and repairing required for the proper installation and completion of the work specified in each division, including plastering, masonry work, concrete work, carpentry work and painting, shall be performed by skilled craftsmen in these respective trades, all at the expense of this Contractor.

3.4 PIPE INSTALLATION

A. Sanitary Waste and Storm Piping: Slope at uniform grade of 1/8 inch per foot unless noted otherwise. Make changes in size with reducing and wye fittings. Run exposed piping parallel or perpendicular to building structure.

B. Vent Piping: Horizontal runs free of drops and sloped to drain to drainage system. Provide Code approved lead flashing with counter flashing at vent penetrations through roof. Combine vents to minimize vent penetrations. Coordinate with Architect.

C. Locations of valves, unions, drains and other components shall be arranged to provide for ease of cleaning, operation, repair, or service. Access panels shall also be sized and located to provide both acceptable proximity and working space for such devices.

D. Piping installations and valves shall be "grouped" where possible to obtain maximum practical use of available space.

E. Domestic water piping shall be installed to allow each system to be shut down and drained for repairs, service, weather conditions or other requirements. "Low point" drain valves shall be provided in piping where liquids are trapped or cannot be drained to a main drain valve location. System is defined as each individual bathroom, laundry, kitchen etc.

F. Condensate Piping: Install as per manufactures recommendations and per local code requirements. Also, for heat pumps route in areas not visible from public areas outside of building. In visible areas paint per arch. instructions.

G. Hose Bibbs: Install as per manufactures recommendations.

3.5 PIPE TEST

A. Drainage, Waste, Vent, Hot, Cold Water And Gas Piping: Test in accordance with local rules and regulations.

3.6 ROOF DRAIN INSTALLATION

A. Coordinate exact location with roof structure. Provide flashing, per architectural detail, and expansion joint.

3.7 FIXTURE INSTALLATION

A. Fixtures Supported on stud partitions, unless specified with chair carriers, shall be supported on heavy concealed brackets (or carrier arms) bolted to 1/4 inch by 5 inch steel plate supports fastened to studs with bolts. Plates shall be welded to steel studs. Plate shall extend one stud beyond fixture mounting point.

3.8 SHOCK ABSORBERS

A. Install Ahead of all solenoid valves. Determine size of absorber by the fixture unit value at the mounting point. It is mandatory that shock absorbers be provided at all equipment and fixtures with fast-closing valves (i.e., Laundry equipment).

3.9 FIXTURE, EQUIPMENT, SYSTEM COMPLETION PROVISIONS

A. Upon completion of installation, testing and operational performance check, leave all fixtures, equipment appurtenances, etc., in clean condition. Remove wires, labels, temporary fastenings, covers, dirt, stains, residues, etc.

3.10 GAS PIPING

A. Provide gas piping to all gas-fired appliances and HVAC equipment.

3.11 Potable Water System Disinfection

A. All new potable water systems shall be flushed , cleaned, and disinfected in accordance w/ state and local codes.

3.12 Condensate Drains

Install condensate drains to mechanical equipment and where specified as required.

3.13 Back flow prevention

Back flow prevention is required on incoming water service as per local code requirements. At time of installation a back flow test is required. The premise owner or responsible person shall have the back flow prevention assembly tested by a certified personnel at time of install. Back flow to be tested on an annual schedule thereafter or per administrative authority.

SECTION 15500 - HVAC

PART 1 - GENERAL

1.1 WORK INCLUDED

A. Work Includes but is not limited to the following major items:

1. All air distribution, heating, cooling, ventilation and exhaust systems.
2. Equipment used for distribution of air, including fans, motors, controls, control wiring, filters, ductwork, air supply outlets, air return or exhaust inlets.
3. Sleeves, hangers, flashings, counterflashing and weatherproofing for mechanical equipment.

1.2 AIR DISTRIBUTION DUCT SYSTEM

A. General: All ductwork, including collars, register boxes, smoke dampers, fire dampers, coil housings, exhaust housing and boxes, ventilation louvers, roof vents and screens, as well as all extractor dampers, and any other miscellaneous items not specifically mentioned but necessary for a complete installation. The latest Standards of SMACNA and/or ASHRAE shall be applied with respect to sheet metal gauge and general construction for round and rectangular ducts.

1.3 SUBMITTALS

A. Provide Shop Drawings for the following equipment:

Exhaust Fans	Diffusers and Grilles.
Fire/Fire-Smoke Dampers.	Rooftop Air Conditioning Units.
Temperature Controls.	Packaged Terminal Heat Pumps.
Duct distribution.	Provide photos prior to covering ducting.

PART 2 - PRODUCTS

2.1 EXHAUST FANS

A. Roof Exhaust Fan: Centrifugal roof type for curb mounting. Weatherproof housing. Motor mounted out of airstream. Bronze or nylon ball bearings with lube fitting. Fan and motor isolated. Disconnect switch in housing. Backdraft damper. Birdscreen. V-belt drive with adjustable sheave on motor.

UL listed. Aluminum. Backward inclined fan wheel. Greenheck, Cook, Penn, Carnes, Exitaire or approved. Range hood exhaust fan shall be UL approved for grease extraction.

B. Cabinet/Ceiling Mounted Fan: Direct drive, vibration isolator for cabinet type, insulated cabinet, disconnect and backdraft damper. Greenheck, Penn, Cook or approved.

2.2 ROOF TOP AIR CONDITIONING UNITS

A. Units: UL approved of single-package type with combination air-to-air cooling and gas heating. Trane, Carrier, Day and Night or approved.

B. Casing: Shall be constructed of galvanneal steel, bonderized and coated with baked enamel.

C. Compressor: The unit shall contain hermetic compressor(s) with suitable vibration isolators and crankcase heater and shall have a five year warranty. Shall have capability to operate down to 0 degree outside temperature. All units 10 ton and larger shall have a minimum of two stage cooling.

D. Coils: Shall be constructed of aluminum plate fins mechanically bonded to copper tubes.

E. Fans and Motors: The indoor air fan shall be of the forward-curved centrifugal type, belt driven motor 5 tons and larger, direct drive multi- speed 4 tons and under. The Outdoor air fan(s) shall be of the propeller type. Provide alternate price for premium efficiency motors.

F. Filters: 2-inch thick pleated glass fiber throwaway type. Provide two sets.

G. Heating Section: Provide AGA approved natural gas heater and complete with all safety controls required by Code. Unit to have spark ignition. Provide 2-stage heating on 10 ton units and larger.

H. Electrical: Electrical connection to be single point connection with all interconnecting wiring internal to unit casing.

I. Safety Controls: Cooling section shall be protected by fusible plug low pressurestat, compressor motor overloads and a timing device which will prohibit the compressor motor from being subjected to starting current more than once every five minutes.

J. Accessories: Economizer hood, birdscreen, backdraft damper, and controls on AC-1, AC-2 & AC-3. Economizers shall be Enthalpy type. Roof curbs on all units. Provide outside air hoods for all AC units.

K. Provide return air smoke detectors on all AC units in excess of 2000 cfm supply air.

L. Indoor Air Quality Sensor: Furnish and field install sensor to monitor CO2 levels, relaying information to Integrated Module Control which adjusts economizer dampers.

2.3 PACKAGED TERMINAL HEAT PUMPS/ AIR CONDITIONERS

A. General: Owner to furnish a one-piece air-to-air, through-the-wall electric heat pump to be installed by contractor. Unit shall be factory assembled,

B. Capacity: See Drawings.

C. Compressor: Shall be a welded hermetic type with internal vibration isolation, overload protection and internal pressure relief valve. Compressor shall have a 5-year protection plan.

D. Coils: Shall be of nonferrous construction with mechanically bonded fins. Factory-installed refrigerant control shall be provided.

E. Fan: Indoor fan shall be a centrifugal, forward curved type direct driven by a 2-speed motor. Indoor fan shall discharge vertically. Outdoor fan shall discharge horizontally.

F. Controls: Shall be factory wired and located in a readily accessible location. Compressor shall be equipped with crankcase heater and suction line accumulator. Compressor and fan motor shall have both thermal and current sensitive devices. An automatic defrost control shall be included to accomplish defrosting (only if required) every 90 minutes for a period of not more than 10 minutes. An integral control panel shall include fan on/off, hi-cool, low-cool, high heat, low-heat. Unit shall have a loss-of- charge protection switch and high and low pressure taps accessible from the inside of the building.

G. Wall: Shall be a single, enclosed, insulated, weatherproof casing constructed of galvanized steel. Unit shall slide out of sleeve for servicing.

H. Architectural outdoor grille, shop painted to match exterior color.

1. Manufacturer: General Electric, Amana, or approved.

2.4 DIFFUSERS AND GRILLES

A. General: Diffuser sizing based on air being introduced at 20F temperature differential, and air being diffused at the 5 foot level to a velocity not greater than 50 FPM. Diffusers selected so as not to exceed the NC-33 curve when the volume damper is 50 percent open. Manufacturer shall guarantee to meet the above performance factors or replace all diffusers where required.

B. Manufacturers: Tuttle & Bailey, Carnes, Krueger, Agilair, Titus, Air Devices, Anemostat.

2.5 DAMPERS

A. Splitter Dampers (SD): Provide where required: constructed of galvanized sheets not lighter than 18 gauge, reinforced to prevent vibration, equipped at both ends with brass bearing mounts and of sufficient length to provide complete shut-off branch duct.

B. Extractors: Provide at all right angle supply branches, behind grilles by the same manufacturer as the supply grilles. Each unit shall be the same size as the grille face.

C. Volume Dampers: Provide in supply, exhaust and return ducts as required for balancing and construct of galvanized sheets not lighter than 18 gauge, reinforced to prevent vibration, equipped at both ends with brass bearing mounts and of sufficient length to provide a complete shut-off of the duct.

D. Provide each damper with an adjustment and locking quadrant device as manufactured by Young Regulator #403 operator for accessible locations, or #315 for non-accessible locations. Ventlock or approved. Provide operating rod and attaching devices as required for #315 operator.

E. Fire Dampers: Provide in accordance with SMACNA Fire and Heat Stop Guide, and local Coder, complete with damper blades, 212°F fusible links, linkage, stops, and sleeves. Adjustable volume type where required. Provide UL labeled dampers, style 'B' blade out of airstream. Shoemaker, Advanced Air, Ruskin, Action Air, Phillips, Prefco, or approved.

F. Fire/Smoke Dampers: Provide in accordance with SMACNA Fire and Heat Stop Guide and local codes. 20 gauge roll form galvanized steel sleeve, 16 guage frame and blades, with 115 ac motor, 160°F Fusible Link. Motor mounted out of air stream for duct sizes smaller than 16"x16". Use in conjunction with UL Listed ionization smoke detectors, provided by the mechanical contractor for each fire/smoke damper. 1-1/2 Hour Fire Damper Listing. Motor UL Listed. Smoke detectors to have normally closed circuit contacts. Motor to hold damper normally open. Damper to be spring return, which allows damper to close if power is interrupted, presence of smoke opens smoke detector contacts, or Fusible Link melts. Damper shall have capability to be reset. Cesco, Prefco, Nailer-Hart or approved. HVAC equipment shall shutdown when fire smoke dampers associated with that HVAC equipment closes. Close fire smoke dampers upon general fire alarm per code requirements. Provide labeling at all fire damper and duct detectors on ceiling grid to identify their locations.

2.6 AIR SYSTEM SPECIALTIES

A. Standard Turn Vanes: Non-adjustable 90 degree air turn, 26 gauge galvanized double wall steel blade, 24 gauge galvanized steel side rail. Vanes 2-1/2 inch on center. H-E-P High Profile as manufactured by Aero-Dyne Company.

B. Standard Flexible Connection: Waterproof, fire resistant canvas. Allow minimum 1 inch slack and 1/2 inch minimum between metal parts. Ventfab or approved.

2.7 DUCT CONSTRUCTION

A. Sheet Metal Duct Work: Construct from galvanized sheet metal to conform to latest SMACNA Standard, 26 gauge min.

B. Flexible Ducts: Galvanized spring steel wire helix covered with continuous liner and attached to liner with spray coating. 1-inch thickness of fiberglass insulation, plastic vapor barrier jacket sealed at both ends. 0.25 K factor at 75F mean temperature, rated for continuous service at 1.5 inch S.P. All joints made with 1/2-inch wide positive locking steel straps.
UL approved per UL #181. Maximum length of 5 feet. Genflex, Thermaflex, Cleavaflex or approved.

C. Range Hood Exhaust Duct: Install per requirements. Construct of 16 gauge stainless steel and/or black steel. Provide all welded construction. (External welds only).

D. Dishwasher Exhaust Ductwork: Construct from steel, aluminum or stainless steel. Seal all joints with Ray-Chem "Shrink-Tape" or mastic and slope duct toward dishwasher.

2.8 FLUES

A. Type "B" metalbestos with approved roof cap.

PART 3 - EXECUTION

3.1 FILTERS

A. Install complete sets of filters before operation of the units. Fans shall not be operated without filters installed. Remove coils from units and clean if units are run without filters.

B. Provide two sets of filter cartridges for each unit. Clean filters to be installed by Mechanical Contractor prior to system balancing and 1 clean set left on the job. Filters used during construction shall be furnished by the Contractor.

3.2 DUCTWORK

A. Erect and install per SMACNA Standards. Pressure test all ducts before covering.

B. Seal all joints in ducts with Ductmate Proseal, DP 1010 duct sealant or NASHUA 367-17 foil-backed tape.

C. All duct dimensions on drawings indicate clear inside dimensions.

SECTION 15950 - CONTROLS

PART 1 - GENERAL

1.1 SYSTEM DESCRIPTION

A. The Contractor shall provide under this section a complete system of electric/electronic automatic temperature control as specified.

B. All the necessary controls, control modules, wiring and installation shall be provided under this section. System to be installed shall be as outlined in this section providing a complete system of devices to perform the sequences outlined herein. Provide control accessories and devices necessary to accomplish the desired result whether specifically mentioned herein or not.

C. A wall thermostat shall be provided for AC-2 and AC-3 units. Thermostats shall be mounted at locations shown on the drawings. Provide locking covers.

1.2 SUBMITTALS

A. Shop Drawings shall be provided showing detailed electric connections to all control devices. All control devices shall be completely identified with manufacturer's type number and functional description. Devices shall also be Coded to labels installed on each control device whose function is not readily apparent. All electric connections of the control system to equipment furnished by others shall be shown. Submit three copies of Shop Drawings for approval before commencing installation.

1.3 COMPLETION REQUIREMENTS

A. After completion of the installation, the Contractor shall instruct the building operating personnel in two (2) hour instruction period. Provide six (6) complete sets of operating and maintenance instruction booklets.

1.4 SERVICE AND GUARANTEE

A. The Contractor shall guarantee the control system installed under this Section of the Specification to be free from defects in workmanship and material under normal use and provide service for a period of one year after acceptance by the Owner.

PART 2 - PRODUCTS

2.1 TEMPERATURE CONTROL WIRING

A. All control wiring (line voltage or low voltage), required to complete the temperature control system shall be installed in accordance with the general Electrical Specification, and all Electrical Codes.

2.2 THERMOSTATS

A. TRANE BAY-SQ-245.01 w/ locking cover.

PART 3 - EXECUTION

3.1 SEQUENCE OF OPERATION

A. Fan Shutdown: Ionization smoke detectors shall shut down AC units and SF units when products of combustion are detected Ionization detectors are to be provided with an additional set of alarm contacts for connection to the building Fire Alarm System. When the Fire Alarm system is activated, F-1 through F-3 shall shut down.

B. HVAC Units: Thermostat shall stage heating,cooling and economizer in sequence to maintain setpoint. Close outside air dampers during N.L.L, M.W.U, and fan shutdown. Fans shall run continuously during occupied cycle.

C. Kitchen Make-Up Air: See hood provider (Captive Aire) drawings for equipment specifications and controls. EF-1 + Vapor hood for total exhaust. Makeup air unit to provide minimum of 80% of makeup air and 20% from filtration from dining room AC-3.

D. PTAC'S: Internal controls shall stage heating, cooling and back-up electric heat to maintain setpoint. Remote thermostat shall stage heating and cooling for all other HVAC units.

E. Exhaust Fans: See schedule for controls

F. DS-2 and DS-3 mulit-zone ductless split system. Each indoor unit to have programmable thermostat with auto switch over from heating to cooling and dead band of 5 degrees.

G. Furnace F-2/F-2A (twin) to be interlocked with entry fire place. Furnace blower motor shall be energized when fire place combustion air motor is operating.

H. EF-1 to auto start with hood temperature sensor. Interlock and controls by hood manufacturer. See Captive Aire drawings for additional information.

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MECHANICAL SPECIFICATIONS

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DATE 8/28/2015

REVISED DATE
1 9/22/2015

SHEET
M4.4